21971

S/020/61/137/005/014/026
B104/B214

The influence of elastic-relaxation ...

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy institut elektrotekhnicheskogo stekla i tekhnologicheskogo oborudovaniya (State Scientific Research Institute of Electrotechnical Glass and Technological Equipment)

X

PRESENTED: December 9, 1960, by M. A. Leontovich, Academician

SUBMITTED: December 2, 1960

Card 5/5

L 2322-66 EWT(d)/FSS-2/EWT(1)/FS(v)-3/EEC(k)-2/FCC/EWA(h) TT/AST/GS/GW

ACCESSION NR: AT5023616 UR/0000/65/000/000/0434/0448

75
B+1

AUTHORS: Vernov, S. N.; Nesterov, V. Ye.; Pisarenko, N. F.; Savenko, I. A.; Tverskaya, L. V.; Shavrin, P. I.

TITLE: Investigation of the upper Van Allen radiation belt at low altitudes during the flights of the satellite ships and artificial earth satellites "Kosmos" from 1960 to 1963

SOURCE: Vsesoyuznaya konferentsiya po fizike kosmicheskogo prostranstva. Moscow, 1965. Issledovaniya kosmicheskogo prostranstva (Space research); trudy konferentsii. Moscow, Izd-vo Nauka, 1965, 434-448

TOPIC TAGS: sputnik, artificial earth satellite, Van Allen belt, radiometry, geomagnetic field

ABSTRACT: The results of radiometric measurements of the Van Allen radiation belt from several "sputnik" and "Kosmos" satellites are discussed. The radiometers consisted of inner and outer scintillation counters and gas discharge counters. The internal scintillation counters recorded electron energies between 50 to 300 kev. Among the various recorded measurements was the variation of radiation intensity with longitude, which was quite apparent in the outer belt and which could be explained clearly by the structure of the actual geomagnetic field. Several

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altitude versus longitude particle drift trajectory curves were obtained to explain the various geomagnetic anomalies observed. Next, data were obtained to determine the location of maxima in the outer Van Allen belt. Over a period of four years this varied within the limits $4 \leq L \leq 6$, and this variation could be associated with geomagnetic disturbances. As a third observation, an electron energy gap was discovered between the outer and inner radiation belts on $2 \leq L \leq 3$. The special profile of the outer Van Allen belt is shown to be characterized by the location of a maximum, a maximum radiation intensity $I_{max}$, and a half-width corresponding to $0.5\ I_{max}$. Intensity measurements and geomagnetic line-of-force cross section estimates gave the following values for the electron lifetimes in the outer belt: for electron energies $> 100$ kev, $T = 5 \times 10^5$ sec, for energies $> 600$ kev, $T = 5 \times 10^7$ sec. Orig. art. has: 13 figures and 1 formula. [04]

ASSOCIATION: none

SUBMITTED: 02Sep65 ENCL: 00 SUB CODE: AA,SV

NO REF SOV: 015 OTHER: 012 ATD PRESS: 4107

Card 2/2 *hd*

TVERSKAYA, I. B.

K[illegible]rnovskiy, [illegible] and Tverskaya, [illegible] "Numerical values of a certain integral"

( On the calculation of the field of sound), Sbornik trudov Kiyevsk. in-ta [illegible]inzhenerov, Issue 1, 1948, p. 134-35.

So: U-3261, 10 April 53, (Letopis 'Zhurnal 'nykh Statey, No. 12, 1949).

TVERSKAYA, M.Ya. [Tvers'ka, M.IA.]; SHAKH, TS.I.; KAGAN, F.Ye. [Kahan, F.IU]

Efficient use of antibiotics in medicine. Farmatsev. zhur. 18 no.2: 10-13 '63. (MIRA 17:10)

1. Kiyevskiy institut usovershenstvovaniya vrachey.

TVERSKAYA, M. Ya.

PASTERNAK, M.N.; TVERSKAYA, M.Ya.; RAYTRUB, B.A. (Moskva)

Functional state of the liver in some infectious diseases. Klin.med. 35 [i.e.34] no.1 Supplement:35 Ja '57. (MIRA 11:2)

1. Iz kliniko-diagnosticheskoy laboratorii Instituta infektsionnykh bolezney AMN SSSR (dir. - deystvitel'nyy chlen AMN SSSR prof. L.V. Gromashevskiy)

(COMMUNICABLE DISEASES) (LIVER)

VAYSMAN, G.A. [Vaisman, H.A.]; SKVIRSKAYA, Ye.S. [Skvyrs'ka, L.S.]; GUREVICH, M.I. [Hurevych, M.I.]; TVERSKAYA, M.Ya. [Tvers'ka, M.IA.]

Study on the production of tinctures from glycoside-containing plant material using ultrasonics. Farmatsev.zhur. 19 no.1:44-49 '64. (MIRA 18:5)

1. Kafedra tekhnologii lekarstvennykh form i galenovykh preparatov Kiyevskogo instituta usovershenstvovaniya vrachey i Institut fiziologii AN UkrSSR.

CA TVERSKAYA, N.P.

2

**Evaporation of a falling drop.** N. P. Tverskaya. *Uchenye Zapiski, Leningrad. Gosudarst. Univ. im. A. A. Zhdanova* No. 120, *Ser. Fiz. Nauk* No. 7, 241-66(1949).—The change in size of drops of water or ice in streams of air flowing at various rates was measured over the temp. range from $-20°$ to $+25°$. The drop size was of the order of 800 $\mu$, and the relative humidity of the air varied from 40 to 80%. In static air, the function $X = dD^2/dt$, where $D$ = drop diam. and $t$ = time, was independent of drop size at const. relative humidity and temp. The function $F$ (equal to the ratio of $X$ in moving air to $X$ in static air) is related to $R$, the Reynolds no., by the equation $F = a(1 + bR^n)$. Above $R$ = 350, the equation can be satisfied by $a = 1$, $b = 0.23$, but the equation is more complex below $R = 350$. The evapn. rate of supercooled water drops is almost comparable to the rate for ice drops, but the rate for the liquid is always somewhat greater, showing its max. difference at $-12°$.

H. K. Livingston

PA 156T88

USSR/Physics - Evaporation
Air Currents

Mar/Apr 50

"Influence of Air Currents Upon the Speed of Evaporation of a Water Drop," N. P. Tverskaya, Leningrad State Order of Lenin, U imeni A. A. Zhdanov, 7 pp

"Iz Ak Nauk SSSR, Ser Geograf i Geofiz" Vol XIV, No 2

Cites results of experimental check of numerical values of expression for vector coefficient f given by Acad L. S. Leybenzon. Compares values of vector coefficient found from experiment and

[redacted] 156T88

USSR/Physics - Evaporation (Contd) Mar/Apr 50

theoretical calculations for Reynolds numbers from 50 to 500. Submitted by Acad L. S. Leybenzon 2 Jul 49.

156T88

TVERSKAYA, N.[redacted]

(N. P.)

TVERSKAYA

TVERSKAYA, N. P.

Influence of a current of air on the rate of evaporation of a drop of water. Millbank-London, 1951. 8 p., diagrs. (Royal Aircraft Establishment. Farnborough, Library Translation no. 367).

Trans. of Vliianie potoka vozdukha na skorost' isparenila kapel' vody.

DLC: GPRR

SO: Aeronautical Sciences and Aviation in the Soviet Union, Library of Congress, 1955.

TVERSKAYA, N. P.

Temperature of evaporation of droplets. N. P. Tverskaya (Leningrad State Univ.). *Izvest. Akad. Nauk U.S.S.R., Ser. Geog. Geophys.* 15, 74-81(1951).—The temp. of evapn. of droplets of water constitutes an important part of the problem of the study of the thermodynamics of the atm. The following equation was used for calcg. the rate of evapn. of a droplet: $dm/dt = (4\pi\Delta M/RT)(E_1 - e)rf$ where $m$ is the mass of the evapg. droplet, $\Delta$ is the coeff. of diffusion, $M$ is the mol. wt., $R$ is the gas const., $T$ is the abs. temp., $r$ is the radius of the droplet, $f$ is the wind factor, $E_1$ is the vapor pressure above the surface of the droplet, $e$ is the vapor pressure in the surrounding air at a large distance from the droplet. This equation combined with the well-known psychometric formula was used as the basis for calcns. made. The results are summarized in the form of a nomogram whose ordinates represent vapor pressure of water in the air some distance from the evapg. droplet. The abscissa is in degrees abs. G. S. M.

TVERSKAYA, N.P., assistent.

Determining the number of the condensation nuclei in the atmosphere. Nauch.biul. Len.un. no.31:16-19 '53. (MLRA 10:3)

1. Kafedra fiziki atomosfery.
(Atmospheric nucleation)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001757630003-9"

TVERSKAYA, N. P.

USSR

551.511:551.573

6.5-114

Tverskaia, N. P., Teplootdacha i isparenie kapli v potoke. [Heat emission and evaporation of a drop in a current.] Akademiia Nauk SSSR, Izvestiia, Ser. Geofizicheskaia, No. 3:259-263, 1953. fig., 2 tables, 7 refs., 4 eqs. DLC—Results of an experimental determination of [illegible] criterion of diffusion and heat with small Reynolds numbers (Re < 30) are presented. [illegible] relationship of these criteria with those of REYNOLDS and PRANDTL is established [illegible] solution of equations pert[illegible]. The author maintains that some theoretical results, obtained [illegible] can be used for calculation of [illegible] ing to the evaporation of a spherical drop in a gas current can be used for calculation of water emission of heat from a globe in a moving medium. *Subject Headings:* 1. Evaporation of water drops 2. Heat diffusion.—*N.T.Z.*

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001757630003-9"

TVERSKAYA, N. P.

"Problem of Determining the Effective Coefficient of Water Drop Collision". Tr. Gl. Geofiz. Observ, No 47, pp 112-118, 1954

A method of experimental study of the coefficient C of drop merging at collision is described. Results of drop merging of 0.5 to 1.5 mm radius at 18 C and 40% relative humidity are presented. The mechanism of merging is established. At relatively high drop velocities the liquid does not merge and the drop is disrupted. (RZhFiz, No 9, 1955)

SO: Sum No 812, 6 Feb 1956

14-57-7-14647

Translation from: Referativnyy zhurnal, Geografiya, 1957, Nr 7, pp 60-61 (USSR)

AUTHORS: Tverskaya, N. P., Yudina, N. P.

TITLE: Experimental Investigation of Water-Drop Conjoining (Rezul'taty eksperimental'nogo issledovaniya koagulyatsii kapel' vody)

PERIODICAL: Tr. Leningradsk. gidrometeorol. in-ta, 1956, Nrs 5-6, pp 263-267

ABSTRACT: The authors continued their previously started investigation (RZhGeogr, 1956, 2817) with the aim of determining the effectiveness coefficient of collisions ($K_3$), and in an effort to clarify the mechanics of large drop formation. The experiments were conducted on the drops of identical sizes (2.3 mm and 1.2 mm) and also on the drops of various sizes (2.3 mm and 2 mm; 2.3 mm and 2.1 mm; 1.3 mm and 1.7 mm; 1.1 mm and 0.5 mm).

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14-57-7-14647

Experimental Investigation of Water-Drop (Cont.)

The formerly constructed apparatus was used again, but it was altered to the extent that the air in the camera could be either dessicated or humidified. The extent of the zone of conjoining $\delta$ was determined in respect to the velocity V at the moment of impact at a given moisture content f. The temperature was maintained at about 16° to 18° C. By the zone of conjoining the authors understand that deviation of the center of the upper drop from a vertical line passing through the center of the lower drop at which the conjoining of the two drops ceases to occur. For the drops of equal sizes at V = 30 cm/sec and f = 36 percent, the extent of the zone of complete conjoining, expressed as percentage of the sum of radii of the colliding drops, is equal to 28 percent. As the amount of translocation of the drop centers is increased, there is formed a transitional zone within which $K_э$ (the ratio of the number of conjoined drops to the total number of colliding drops) decreases to zero. At the translocation equal to 38 percent all the impacts become ineffective. At f = 93 percent, the extent of the zone of full
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14-57-7-14647

Experimental Investigation of Water-Drop (Cont.)

conjoining expands so as to include the deviations of 43 percent without altering the extent of the transitional zone. The relation of the zone of conjoining to V for various sizes is expressed graphically. In all the cases, the increase of the velocity leads to the diminuition of this zone, and the rate of diminuition is more uniform for the smaller drops. It can also be seen from the graphs that the zone of conjoining increases with the increase of f, which fact can be probably explained by the intensification of drop evaporation and by the acceleration of the vapor flow from the drop surface to the air. The impacts of the drops 1.1 mm in size against those 0.5 mm in size were more effective than the impacts of drops with any other size relations. The results of these experiments agreed fully with those of the previous work. The article includes a bibliography of 10 titles.

Card 3/3 A. B.

TVERSKAYA, N.P.

Experimental study of collision and coalescence of charged drops.
Trudy GGO no.73:123-131 '58. (MIRA 11:9)
(Atmospheric electricity) (Drops)

L 47144-66 EWT(1) GW

ACC NR: AR6000719 SOURCE CODE: UR/0124/65/000/009/B106/B107

51
B

AUTHOR: Tverskaya, N. P.

TITLE: Exchange of turbulence in clouds of vertical development

SOURCE: Ref. zh. Mekhanika, Abs. 9B701

REF SOURCE: Tr. Leningr. gidrometeorol. in-ta, vyp. 22, 1964, 73-82

TOPIC TAGS: meteorologic observation, turbulent boundary layer, atmospheric turbulence, atmospheric cloud, synoptic meteorology

ABSTRACT: Calculation of the turbulence coefficient K, on days when cumulus and cumulonimbus clouds were observed, was performed for the boundary layer according to the equation of D. L. Laykhtman $(K = W_z H^4/g^2 \ln(\theta_H/\theta_0)^2)$, and for the free atmosphere according to the Matveyev equation: $K = (V^2/\beta)[2.3 \lg \beta - 1.6 \lg(\gamma_a - \gamma) - 0.072]$. Data of the temperature-wind sounding of the atmosphere in Voyeykovo were employed. The obtained K values fluctuated widely. In the boundary layer the turbulence coefficient was most frequently within the interval of 25--96 $m^2$/sec; the maximal value of 188 $m^2$/sec was obtained on 23 June 1960. In almost all cases K was greater during the day than in the mornings or evenings; with increased cloudiness K increases comparatively slowly. Calculation of K for the free atmosphere was performed for the cases when cumulonimbus cloudiness of 8--10 balls and vertical spread from 8 to 10 km was observed; in these cases the sounding data can be related to clouds. Plots are given for the

L 47144-66 EWT(1) GW

ACC NR: AR6000719 SOURCE CODE: UR/0124/65/000/009/B106/B107

51

B

AUTHOR: Tverskaya, N. P.

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L 08152-67 EWT(1)/EWT(m) IJP(c) DS/WW/GW
SOURCE CODE: UR/0362/66/002/004/0439/0442

ACC NR: AP6014591

AUTHOR: Tverskaya, N. P.

ORG: None

TITLE: Fifth all-union intervuz conference on problems of the evaporation, combustion, and gas dynamics of dispersed systems

SOURCE: AN SSSR. Izvestiya. Fizika atmosfery i okeana, v. 2, no. 4, 1966, 439-442

TOPIC TAGS: atmospheric physics, dispersed system, aerosol system, phase transition theory, condensation nuclei, fog, aerosol dispersion, atmospheric pollution, surfactant, cloud process, aerosol capture, aerosol coagulation

ABSTRACT: The Fifth All-Union Intervuz Conference on the Problems of Evaporation, Combustion, and Gas Dynamics of Dispersed Systems was held 27 September through 3 October 1965 in Odessa. The Conference was divided into two sections: physical gas dynamics and phase transitions. More than fifty papers were presented on the theory of phase transitions, methods of studying dispersed systems, capture phenomena, properties of ice-forming aerosols, condensation nuclei, fogs, etc. Seventy-three organizations and more than 200 specialists of the Academy of Sciences, the Hydrometeorological Service, higher educational institutions, and other organizations participated in the Conference. The plenary

UDC: 551.52: 551.573: 551.574: 551.575

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session was opened by the President of the Odessa State University, Professor A. I. Yurzhenko. His speech was followed by a paper presented by B. V. Deryagin on new achievements in the investigation of coarsely dispersed aerosols. The rationality of dividing aerosol systems into coarsely and finely dispersed systems relative to a number of laws governing them was examined in detail in this paper. The contents of papers dealing with the physics of the atmosphere are given below.

Theoretical and Experimental Investigations of Dispersed Systems

B. V. Deryagin and Yu. A. Yalamov (Moscow) proposed a formula for the rate of thermophoresis of large and moderately large aerosol particles in which the temperature jump at the surface of the particles is taken into consideration, and a formula for rate of diffusophoresis. The rate of diffusophoresis was determined from the kinetic equations for gas transfer through a barrier consisting of spheres rigidly fixed in space. Comparison of theoretical formulas with experimental data showed good agreement. The paper by I. M. Yur'yev (Moscow) on determining the coefficient of capture of aerosol particles proposed a simple analytic solution for the capture of bodies of arbitrary shape which is based on interpreting

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the motion of aerosol particles as "flows of a pseudoliquid." The accuracy of the formulas was verified by comparing them with known calculations of the local capture coefficient for an ellipse. The problem of fog formation in a Wilson cloud chamber was discussed by M. V. Buykov and V. P. Bakhanov (Kiev). The equations for steam temperature in the chamber, supersaturation of steam, and the distribution functions by size of the liquid-phase nuclei were solved. In their solutions the authors took into account the heat exchange with the surrounding medium and the heat loss in condensation.

V. L. Sigal and M. V. Buykov (Kiev) solved the problem of intense evaporation of drops of a solvent when the law of change with time in drop radii is known and independent of concentration. Diffusion of the solute within the drops plays a large role in these processes. However, the concentration field is determined by the time required for the first crystals to form in a drop. I. P. Mazin (Moscow) reported on a method for taking account of the relaxation times in the transition from temperature fluctuations to humidity fluctuations, which must be taken into account in forming cloud droplet spectra. V. I. Smirnov (Moscow) pointed out the need for taking account of turbulent Brownian coagulation of charged aerosols which affects the coagulation

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constant. V. M. Voloshchuk (Krivoy Rog) presented an interesting communication on the theoretical calculation of the capture coefficient of particles in a flow with high Stokes numbers. L. M. Royev, A. V. Levin, and B. Ye. Fishman (Kiev) gave a report on the dependence of saturated vapor pressure on temperature. The paper by G. L. Babukh and A. A. Shrayber dealt with an investigation of the mechanism of the motion and heating of a dispersed substance for a two-fraction material and continuous particle-size distribution. Dispersed particles in a two-phase flow rotate because of collisions of particles having rough surfaces. The authors also discussed the results of studies of the motion and heat exchange of particles in a pulsed gas flow. The paper by V. P. Belyakov, M. L. Dranovskiy, S. I. Sul'zhenko, and A. K. Simonovskiy (Moscow) was devoted to the results of studies on the behavior of drops of a liquid in an acoustic field. An equation was derived for the motion of spherical and cylindrical bodies in an acoustic field. When flows move around drops at varying velocities, the drops have a different resistance coefficient from that which would exist for flows at a constant velocity. Critical Weber numbers characterizing the stability of drops in an acoustic field were determined experimentally. The drop-

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disintegration time was determined as a function of the parameters of the liquid and the acoustic field.

K. B. Tolpygo and A. V. Chalyy (Kiev) solved the inverse problem of the theory of light scattering and proposed utilizing the indicatrices of radiation scattered forward and backward through the boundaries of the medium to reconstruct the function of the distribution by size of scattered particles of the medium.

Methods and Apparatus for Investigation of Dispersed Systems

The paper by S. M. Kontush and V. A. Fedoseyev (Odessa) dealt with special features of measuring the microphysical characteristics of hygroscopic smoke by studying the condensational growth of smoke particles. A jet-type device was used for this purpose. It was found that the characteristics obtained for some smokes could be described analytically with the aid of a logarithmic normal distribution.

L. V. Ivanchenko and S. M. Kontush (Odessa) reported on basic design features of continuously operating automatic counters, resembling the VDK counters. They point out that

ACC NR: AP6014591

special attention must be devoted to calibrating instruments when investigating the dispersed composition of aerosols.

V. K. Yeroshov, G. Ya. Vlasenko, and B. V. Deryagin (Moscow) reported on the construction of a photoelectric attachment for a continuously operating VDK-4 ultramicroscope, designed to automate the counting of electrical pulses appearing in a photomultiplier tube caused by the light reflected from aerosol particles passing through the illuminated zone of the cell of the instrument. The photoelectronic attachment has an FEU-29 electronic multiplier, a "Siren' "-type amplifier, and B-2 and B-3 counting devices. The attachment registers pulses from particles larger than 0.2 μ with the concentration measured varying from $10^6$ particles/$sec^3$ with an accuracy of 15—20%. Light scattering by the cell becomes commensurate with the light pulses from particles with diameters less than 0.2 μ. The formulas used in calculating the concentration of an aerosol system are the same as those used in ordinary VDK instruments without the attachments.

V. A. Shnaydman and N. A. Kisel' (Odessa) reported on a device they designed for finding the particle distribution

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function by size and the average size of the particles. The laboratory-field apparatus includes: FIOPS—a photo-electric device for measuring the optical density of the medium, a VDK-4, filters for determining the concentration by weight of smokes, and a cascade impactor for determining the distribution function and the average size of smoke particles. Laboratory investigations showed that in practice the distribution function does not depend on the air humidity. Measurements taken under natural conditions showed that growth of particles up to the maximum size (1.5—2 μ) takes place close to the source. Microstructural characteristics are measured as functions of the distance from the source, the height at which measurements are taken, and local factors. Microstructural measurements can be processed by the L. M. Levin method.

Ivlev (Leningrad) reported on an aerostatic impactor and automatic calculation of samples.

Changes in the Properties of Dispersed Particles Adsorbed by Various Added Reagents

Many papers were devoted to discussion of changes in the rate of drop evaporation during artificial modification.

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B. V. Deryagin, L. A. Rozentsvayg, and V. A. Fedoseyev (Odessa) discussed changes in the rate of evaporation of drops kept for various periods of time in cetyl alcohol vapor. Information was obtained on the kinetics of adsorption and the formation of monolayer films from the gaseous medium on the surface of the drops. A determination was made of the dependence of the degree of saturation of a monolayer on the cetyl alcohol vapor concentration in the flow.

The paper presented by L. F. Leonov and B. S. Prokhorov (Moscow) was devoted to the results of studying the rate of formation of a monolayer on a drop of water from the vapor and dispersed phases of a surfactant. The rate of evaporation or condensation of drops of water can be changed by introducing either hygroscopic substances or surfactants, with fundamentally different effects on the above-mentioned processes. Insoluble surfactant films on drops reduce the rate of evaporation significantly more than do hygroscopic substances. The rate of formation of a monolayer from vapors of insoluble surfactants was studied by the "lying" drop method (changes in the surface tension of drops kept in

ACC NR: AP6014501

surfactant vapor were measured). The dependence of the surface tension of drops on the time they remained in surfactant vapors permits one to estimate the spreading rate of a monolayer. This spreading takes place very slowly over several hours.

The paper by B. K. Ivanitskiy and Yu. I. Shimanskiy (Kiev) presented the results of an investigation of the rate of evaporation of drops from an aqueous solution of the surfactant, trimethyl alkyl ammonium chloride, in different volumetric concentrations at 20C and relative humidities of 15, 53, 75, and 94%, under pressures of 750 to 25 mm Hg. The surfactant noticeably decreases the rate of evaporation when an adsorbing layer is formed. The radius varies linearly with time. The rate of evaporation of the surfactant depends slightly on changes in pressure for all relative humidities. The decrease in surface temperature of drops was insignificant. The evaporation coefficient was calculated on the basis of experimental data.

L. I. Boldunova, L. P. Zatsepina, and A. D. Solov'yev (Moscow) reported on the method and the results of studies of the effect of additions of surfactants on the dispersion of liquids. The authors conducted experiments involving spraying

the liquid into a chamber free of aerosol and into a chamber containing a concentrated sodium chloride solution with and without additions of the surfactant. The effects of dispersion were compared. It was established that adding a surfactant affected the dispersion of the forming aerosol, the more so with increased molecular weight of the surfactant. Some very active surfactants reduced this effect at high molecular weights. Thus, moderately active surfactants had the greatest effect on dispersion. It was stated that the decrease in the effect of additions of high-molecular surfactants was obviously related to the decrease in the rate at which adsorption equilibrium is achieved in solutions of these substances and with a reduction in the dynamic surface tension with high rates of drop formation.

Investigation of Ice-Forming Aerosols

Since 1961, personnel of the High-Altitude Geophysical Institute have been using artillery shells filled with ice-forming reagents to modify hail-forming processes. A. S. Zhikharev (Nal'chik) reported that ice-forming aerosols were produced by exploding 5-g charges of a mixture of silver iodide and lead iodide with hexogen. Optimal mixtures of explosives and ice-forming reagents produced a yield of ice-

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forming nuclei per gram which was as good as the pyrotechnical mixtures in use. Explosive mixtures were recommended for arming antihail devices.

Some problems arising in investigations of ice-forming aerosols were discussed in a paper by I. I. Gayvoronskiy, N. O. Plaude, and A. D. Solov'yev (Moscow). The most urgent problem is generating active particles. The principal difficulty is obtaining highly dispersed aerosols (0.01—1 μ) without disrupting their ice-forming activity. A thermal condensation method of generation was recommended. It was emphasized that laboratory modeling of the processes of artificial crystallization of natural clouds and fogs is of special significance. The principal difficulty in finding new active substances is that too little information is available on the mechanism of ice formation on a different substrate. The paper included a discussion of some experimentally determined correlation patterns between ice-forming activity and the physicochemical properties of the substances; prospects for obtaining new effective aerosols by synthesizing new ice-forming substances and by improved methods of generation are described as promising.

The paper by ... D. Malkina, V. V. Patrikeyev, and M. R.

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ACC NR: AP6014591

Mamedov (Moscow) was devoted to the use of organic substances to stimulate crystallization of cloud drops as an antihail measure. Three new organic substances were found which have a high temperature threshold for crystallization and which have a pronounced deforming effect on drops. They are plentiful and cheap. I. G. Kuntsevskiy and L. M. Royev (Kiev) proposed a design for ice crystal generators.

Processes in Clouds and Fogs

The paper of M. I. Dekhtyar and M. V. Buykov (Kiev) dealt with the formation and development of a stratus cloud based on the use of the kinetic equation for the distribution function of cloud drops, taking sedimentation and the transfer equations for concentration of vapor and temperature into consideration. The evolution of the spectrum of cloud drops was considered in stages: 1) growth due to condensation while rising in an air current (even though coagulating processes may play an important role in this stage); and 2) growth while falling through a cloud due to condensation or due to condensation and gravitational coagulation. Distribution functions for cloud drops by size, variation in temperature, and supersaturation with height are derived for each stage.

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5

The problem of reconstituting the spectrum of condensation nuclei from data on the kinetics of fog formation was solved by M. V. Buykov (Kiev). The spectrum of condensation nuclei serving as centers for the formation of fog droplets was found by the known function of the distribution of fog droplets by size and time change.

L. M. Levin and Yu. S. Sedunov (Obninsk) reported on the possibility of recalculating the spectrum of drops from spectrum activity during supersaturation, a more general phenomenon. The size of the nucleons is a function of supersaturation, and the spectrum changes with changes in air supersaturation. The rate of formation of nuclei is a function of the rate of ascent since fluctuations in supersaturation appear in this case. The influence of the heat of phase transitions on the rate of diffusion processes in clouds was discussed in the paper by B. Sh. Beritashvili and Yu. A. Dovgalyuk (Leningrad).

A. V. Silayev and L. M. Royev (Kiev) reported on measurements of the optical density of fogs formed on natural and artificial NaCl and $NH_4Cl$ condensation nuclei with variations in their sizes and concentrations.

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ACC NR: AP6014501

Experimental Investigations of the Capture Coefficient

A paper by A. V. Stavitskaya and Ye. N. Ovchinnikova (Odessa) presented the results of the method developed and an investigation of local capture coefficients by a disk-shaped barrier. The dependence of the capture coefficient on the distance from the center of the disk was found.

The results of investigating the capture and coagulation of an aqueous aerosol by a horizontal filament were discussed in the paper of N. G. Vereshchago and Ye. N. Ovchinnikova (Odessa). Formulas were derived for determining the effectiveness of settling of an aqueous aerosol on a fine filament; these formulas have been verified experimentally.

The paper of N. S. Shishkin (Leningrad) on conditions for development of snow, snow pellets, and hail in supercooled regions was presented at the concluding plenary session. The growth of ice particles in clouds is determined by the conditions for their condensation and coagulation with cloud drops and by heat-transfer processes. In transitions from snow to snow pellets, the rate of growth of the mass of a particle due to coagulation with supercooled drops exceeds

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ACC NR: AP6014501

the rate of sublimation growth of the mass. Transitions from sleet to hail are related to the heat balance of falling spherical particles. Calculations of the conditions for transitions from sleet to hail and the development of variously shaped snowflakes agree with observed results.

V. A. Fedoseyev delivered the closing address in which he summarized the results of the Conference. The resolutions adopted particularly emphasized the need for publication of all papers which had been presented and for the convocation of the next conference in 1966. [W.A. No. 50; ATD Report 66-100]

SUB CODE: 04 / SUBM DATE: none

Card 15/15

ERFUSSI, Ya.I., red.; TVERSKAYA, Sh.D.[translator]; DANILOV, N.A., red.; DZHATIYEVA, F.Kh., tekhn. red.

[Pulse methods for television measurements] Impul'snye metody televizionnykh izmerenii; sbornik statei. Moskva, Izd-vo inostr. lit-ry, 1961. 114 p. Translated articles. (MIRA 15:4)

(Television—Measurement)

TVERDOVSKIY, N.P., uchitel

Our suggestions. Khim.v shkole 15 no.1:60-61 Ja-F '60. (MIRA 13:5)

1. Srednyaya shkola No. 600 goroda Moskvy.
(Chemistry--Study and teaching)

PROCESSES AND PROPERTIES INDEX

**Extraction of rubber and guttapercha from grassy and bushy rubber-bearing plants.** K. A. [illegible], S. S. Tverskaya, I. M. Lapshin, A. M. Ignatiev, and G. I. Preigerson. U.S.S.R. 68,448, May 31, 1947. An adsorbent, e.g. activated C, is added to the mill where the plant material is ground. M. Hosch

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

Rubber Abstracts

Gutta-Percha, Balata, Chicle and Jelutong

K.A. SIMONOV
S.S. TVERSKAYA
I.M. LAPSHIN
A.M. IGNATIEV
G. I. PREIGERSON

**Extraction of rubber and gutta-percha from grassy and bushy rubber bearing plants.** K. A. S[illegible], S. S. TVERSKAYA, I. M. LAPSHIN, A. M. I[illegible], and G. I. PREIGERSON (U.S.S.R. [illegible] Chem. Abs., 1949, 43, 6456). An adsorbent, [illegible] activated carbon, is added to the mill where the plant material is ground. 3AI

1949

SAVCHUK, S.I., kand. tekhn. nauk; TVERSKOY, A.M., inzh.

Trends in the scrubbing of flue gases. Teploenergetika 12 no.8: 89-90 Ag '65. (MIRA 18:9)

TVERSKIY, A.M., inzh.

Use of thermal waters in the production of electric power. Energ. i elektrotekh. prom. no.3:68-69 Jl-S '64. (MIRA 17:11)

TVERSKOV, V.A.; MOROZOV, I.S.

System $ZrCl_4$ - $MgCl_2$ - KCl. Zhur. neorg. khim. 9 no.9:2203-2208 S '64. (MIRA 17:11)

TVERSKOY, A. D.

25155, TUERSKOY, A. D. Nasha Koneuodcheskaya Ferma. (Proizvod. Opyt Geroev Sots. Truda K. N. Mayatskogo I. P. U. Shaforstoua. Kolkhoz Im. Budennogo-Apanas'eusk. Rayon Staurop. Kraya.) Konevodstuo, 1949, No. 4, S. 33-37

SO: Letopis' No. 33, 1949

[illegible]

[illegible]: [illegible] of combustion electric power stations according to [illegible] of atmospheric air

SOURCE: [illegible] stantsii, no. 7, 1966, 10-11

[illegible]: atmospheric contamination, industrial waste, electric power plant, coal

[illegible]: In order to determine the influence of the quality of the Donets coal used on the limiting power of electric power stations, the dissemination of [illegible] sulphur into the atmosphere from the smokestacks of electric power stations when this coal is burned was calculated. Although the first attempt to establish the limiting concentration of the primary ingredients of smoke in the air over populated areas was performed in 1934, little was [illegible] in respect to smoke concentration reduction over a 15 year period thereafter. During this period only some work on the so-called wet processes for [illegible] of $SO_2$ chemically were performed. The authors conclude that the [illegible] of large capacity power stations with sulphur dioxide removal [illegible] is more promising than the construction of smaller capacity power [stati]ons in order to avoid the problem of sulphur dioxide pollution. This

UDC: 621.311.22;621.311.15

Card 2/2

TVERSKOY, A.M.

Dust prevention in an electric power plant in the U.S.A.
Energ. i elektrotekh. prom. no.1:75 Ja-Mr'64. (MIRA 17:5)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001757630003-9"

TVERSKOY, B. A.

"On theQuestion of Light Element Formation in Stellar Atmospheres,"

paper presented at the 10th Gen. Assembly, Intl. Astronomical Union, 13-20 Aug 1958, Moscow,

31800
S/203/61/001/005/001/028
A006/A101

24.5200

AUTHOR: Tverskoy, B.A.

TITLE: On the problem of convection in a rotating sphere. I.

PERIODICAL: Geomagnetizm i aeronomiya, v. 1, no. 5, 1961, 629 - 637

TEXT: The author studied convection in a rotating sphere for the purpose of applying the results to problems of terrestrial magnetism. The method of vector analysis and a visual model were employed to investigate quasi-elastic properties of a rotating ideal liquid, low oscillations in a rotating isentropic sphere and least stable disturbances. On the basis of data on the viscosity of the earth's core substance it can be confirmed that rotation plays an important part since Coriolis forces are much stronger than viscous stresses arising during motion at a scale of order of core radius a. It is shown that at weak superisentropic overheating convection in the rotating sphere is brought about either by the transposition of adjoining force tubes of the rotor of velocity $\Omega$, or by the oscillations of these tubes along $\Omega$. In both cases the spatial parameter of such oscillations, transverse in respect to $\Omega$, is small in comparison to radius a of the sphere. The results obtained are compared with low-pressure plasma in a strong

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A006/A101

On the problem of convection ...

magnetic field. At small deviations from isentropy, only low frequency oscillations can arise. Considering the form of these oscillations it can be concluded that convection must have the nature of two-dimensional turbulence. The following conclusions are drawn: if the density of kinetic energy of a disturbed motion is low as compared to the density of rotation energy, the force tubes of the rotor of velocity $\Omega$ acquire elasticity to bending, tilting and twisting. These results can be used as a zero approximation when studying convection in a rotating gravitating sphere for the case when excessive gravitational energy connected with non-uniform heating is much below the kinetic energy of rotation. Hence, the basic scale, velocity in the basic scale of turbulence and factors of turbulent transfer can be determined. This will be dealt with in part II of the article. The author thanks Academician M.A. Leontovich for his assistance. There are 2 figures and 10 references: 5 Soviet-bloc and 5 non-Soviet-bloc.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonoseva (Moscow State University imeni M.V. Lomonosov) Institut yadernoy fiziki (Institute of Nuclear Physics)

SUBMITTED: July 4, 1961

Card 2/2

31801
S/203/61/001/005/002/028
A006/A101

24.5200

AUTHOR: Tverskoy, B.A.

TITLE: On the problem of convection in a rotating sphere. II.

PERIODICAL: Geomagnetizm i aeronomiya, v. 1, no. 5, 1961, 638 - 645

TEXT: The author investigates stationary conditions of turbulent convection in a rotating gravitating sphere. The properties of this motion are studied, namely: motion in the basic scale; local properties of turbulence, turbulent heat conductivity and steady temperature distribution, and heat transfer parallel to the rotation axis. It is shown that convection has the nature of two-dimensional turbulence with basic scale $l \sim \alpha a$ and velocity in this scale $v_0 \sim \alpha^2 a \Omega$. The basic scale is determined from the condition of equality of work required for the transposition of two adjoining force tubes with radius $\sim l_0$ and the work of Archimedean force at this transposition. It was found that turbulence was uniform and isotropic, and that the interaction of transverse and longitudinal oscillations of tubes manifests itself only in the second order in respect to $\alpha$. It can therefore be considered that the flux of energy, continuously transferred from larger scales of transverse motion to smaller ones, is constant. Consequently, there is a full

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On the problem of convection ...

analogy with a three-dimensional problem on local properties of a developed turbulence, and results obtained for the three-dimensional case can be applied to two-dimensional turbulence. Stationary temperature distribution is obtained from the equation of turbulent thermal diffusivity with the transfer factor $\chi_{tweb} \sim l_o v_o$. Conditions are analyzed when two-dimensional turbulence is preferable to other processes. The author analyzes the application of results obtained to the earth's core. The following parameters of the core are given: radius $a \approx 3.10^8$ cm, $\Omega \approx 10^{-4}\ \mathrm{sec}^{-1}$, $\rho \approx 10\ \mathrm{g/cm}^3$ and $C \approx 0.1$ cal/g. degree; $\chi$ in the core will exceed $\chi$ value under normal conditions (0.1 - 0.7 cm/sec in the case of metals) by a factor of 5 - 10; $\beta$ factor is supposed to be $\sim 10^{-6}$ 1/degree; $Q \lesssim 4.10^{-14}$ cal/cm$^2$ sec. Number q at such parameters is $\sim 10^{-12} - 10^{-13}$, so that the basic scale $l_o$ is about $3.10^6$ cm; $v_c \sim 1 - 3$ cm/sec, and Re $\sim \underline{10^6 \div 10^7}$. From the condition of steadiness it is found that the described conditions are attained at $\nu \lesssim 100\ \mathrm{cm}^2/\mathrm{sec}$. According to seismological data $\nu$ in the core is $\lesssim 10^8\ \mathrm{cm}^2/\mathrm{sec}$; however, the lower limit is not known and many authors suppose $\nu$ to be about 0.1 - 0.01 cm$^2$/sec. At large $\nu$ when $1 < R < P^2$, convection remains apparently two-dimensional, but has a self-oscillating nature. When $R \lesssim 1$ Chandrasekhar conditions arise. Ref. 2: S. Chandrasekhar. Proc. Roy. Soc. 1953, vol. 217, 306).

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31801
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A006/A101

On the problem of convection ...

$\nu$ must then be $\geqslant 10^6 cm^2/sec$. The author thanks Academician M.A. Leontovich for his assistance. There are 7 references: 6 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova (Moscow State University imeni M.V. Lomonosov) Institut yadernoy fiziki (Institute of Nuclear Physics)

SUBMITTED: July 4, 1961

Card 3/3

35354
S/203/61/001/006/007/021
D055/D113

3,2420 (1049, 1395, 1482)

AUTHOR: Tverskoy, B.A.

TITLE: Contribution to the theory of Coulombian scattering of fast electrons in the Earth's outer radiation belt

PERIODICAL: Geomagnetizm i aeronomiya, v. 1, no. 6, 1961, 902-910

TEXT: The Coulombian scattering of fast electrons on a cold, completely ionized plasma in symmetrical magnetic traps is investigated. A kinetic equation is derived for the function of distribution in the plane of symmetry, and a general solution is given for the corresponding problem with initial conditions. Numerical results are given for the case of a linear and approximately point dipole with a constant density of the cold plasma. It is shown that the breakdown of electrons is conditioned mainly by losses of energy in collisions, while scattering in plugs plays hardly any part. The duration of various angular harmonics is calculated, and it was found that the time that the first harmonic maintains its initial angular distri-

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bution is comparable with the life of an electron. The other harmonics are quickly attenuated as a result of collisions and the corresponding particles are distributed isotropically according to angles with hardly any energy losses. The connection between the steady-state distribution and the angular distribution of sources is discussed on the basis of these results. Most of the electrons in the belt are distributed between the isotropic and first harmonics of angular distribution. The time in which the higher angular harmonics turn isotropic is much less than the life of an electron in the belt. This quantity $t_e$ is fully determined by its initial energy E as follows:

$$t_e = \frac{10^8}{N_o} E^{3/2} \text{ sec} = \frac{3E^{3/2}}{N_o} \text{ years},$$

where E is measured in kev, $N_o$ in $1/cm^3$. The accuracy of these conclusions is limited by the assumptions that no electrons break down because of magnetic scattering and that the density of the cold plasma is constant. Although several arguments favor these assumptions, a more thorough study of

the dynamics of the outer belt is needed. There are 1 table and 9 references; 6 Soviet and 3 non-Soviet. The three English-language references are: J. Walch, W. Whitteker, J. Geophys. Res., 1959, 64, no. 8; N.C. Cristofilos, J. Geophys. Res., 1959, 64, no. 8; E. Parker, J. Geophys. Res., 1960, 65, 3117.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova. Institut yadernoy fiziki (Moscow State University imeni M.V. Lomonosov. Institute of Nuclear Physics)

SUBMITTED: August 25, 1961



APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001757630003-9"

23835

S/020/61/138/002/018/024
B104/B207

3.2600

AUTHOR: Tverskoy, B. A.

TITLE: The effect of the external drift currents upon the magneto-hydrodynamic self-excitation of the magnetic field of the Earth

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 138, no. 2, 1961, 348-350

TEXT: The radiation belt of the Earth which drifts in the inhomogeneous magnetic field and consists of electrons of 0.01 to 0.1 Mev, forms a circular current which has the same sign as the currents in the interior of the Earth. The maximum field strength of the circular current is 400 gamm [Abstracter's note: Unit is not defined]. Magnetic storms disturb the external radiation zone, thus, creating external currents just like in the interior of the Earth. These currents last several days and produce fields with field strengths of approximately 60 gamm in the proximity of the Earth. On the basis of experimental results, it may be said that the Earth is surrounded by a drift current the field of which is parallel to the dipole moment of the Earth in its proximity, and may be

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regarded as homogeneous. The mean value of this field of the Earth is approximately 100 gamm. The drift current is assumed to be produced by filling up the magnetic traps of the Earth by fast electrons during magnetic storms. The occurrence of magnetic storms and their energy are determined by the solar activity and the dipole moment of the Earth. Assuming that the solar activity is constant on an average, the field strength of the drift currents near the Earth may be assumed to be determined by the following relation:

$$\vec{H}_o = \frac{M}{R^3} K(M) \qquad (1)$$

$\vec{M}$ is the dipole moment of the Earth, K a dimensionless function of M, R, the radius of the Earth's core. The author investigates some conclusions from (1). $\vec{H}_o$ penetrates into the Earth's core where it interacts with the convection currents of the conducting masses. The external field may, under certain conditions, induce an additional dipole moment $\vec{M}'$ which amplifies the main field and increases $\vec{H}_o$. Self-excitation occurs in this case. In the figurative sense, this phenomenon may be regarded as a dynamo, whose stator is the exterior radiation belt and whose rotor is the Earth's core. The magnetic storms are the feedback. The equation

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$\vec{M}' = qR^3\vec{H}_o$ (3) holds for any type of convective currents; in this equation, the coefficient q is a function of the character of the current and may assume values between -2 and any positive value. For $kq = 1$ [Abstracter's note: k is not defined] it follows from (1) and (3) that $\vec{M} = \vec{M}'$. $kq > 1$ is the condition for the occurrence of a self-excitation. If $H_o$ is assumed to be 100 gamm on the assumption that M be quasi-equal to $M_o$, the following is obtained: $k(M_o) \sim 10^{-4}$ and $q \sim 10^4 \gg 1$. In conclusion, the author investigates an example in which q is assumed to be very large. A convection current occurs in a homogeneous, gravitating sphere the substance of which passes over, under great pressure, into the liquid metallic state, if a negative temperature gradient exists. If the convection currents have quadrupole symmetry and the core is not large, the motion in cylinder coordinates has the following form:

$$V_z = 2V_o z/R, \quad V_r = -V_o r/R, \quad V_\varphi = 0 \qquad (5)$$

On the assumption that a homogeneous magnetic field $H_z = H_o$ exists, the author derives for $\sigma \neq 0$, the following solution:

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The effect of the external drift currents... S/020/61/138/002/018/024 B104/B207

$$H_r = H_\varphi = 0;$$

$$H_z = \begin{cases} H_0 e^{\lambda(1-r^2/R^2)} & (0 \leqslant r \leqslant R), \\ H_0 & (r > R), \end{cases} \qquad (8)$$

where $\lambda = 2\pi\sigma V_0 R/c^2$. For the dipole moment of the unit length of the cylinder the following is obtained:

$$M_1 = \frac{R^2}{4} H_0 (e^\lambda - 1) \qquad (9).$$

Herefrom, it may be seen that at sufficiently great $\lambda$ in the core, an additional dipole moment is induced for which the following holds: $M' \sim H_0 R^3 e^\lambda$, i.e., $q \sim e^\lambda$. The author thanks Academician M. A. Leontovich and Professor D. A. Frank-Kamenetskiy for their interest in the work and discussion. There are 3 references: 2 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: S. Shapman, J. Bartels, Geomagnetism, 2, Cambridge, 1953.

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S/020/61/138/002/018/024
B104/B207

The effect of the external drift currents...

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

PRESENTED: December 30, 1960, by M. A. Leontovich, Academician

SUBMITTED: December 2, 1960

Card 5/5

IVANENKO, I. P., TVERSKOY, B. A. and SHABANSKIY, V. P.

"On the radiation belt theory"

report to be submitted for the 13th Intl. Astronautical Congress, IAF, Varna, Bulgaria, 23-29 Sep 1962.

TVERSKOY, B. A.

Dissertation defended for the degree of Candidate of Physicomathematical Sciences at the Institute of Atmospheric Physics in 1962:

"Problem of Free Thermal Convection in a Rotating Gravitating Sphere."

Vest. Akad. Nauk SSSR, No. 4, Moscow, 1963, pages 119-145

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001757630003-9"

42158

S/203/62/002/001/006/019
I023/I223

3.2310

AUTHOR: Tverskoy, B.A.

TITLE: Oscillations of an isothermal conducting atmosphere in the presence of gravitational and magnetic fields, and harmonic pulsations of the magnetic field of the Earth

PERIODICAL: Geomagnetizm i Aeronomiya, v.2, no.1, 1962, 61-67

TEXT: The investigation of plasma free oscillations is very complicated, especially for low frequencies, where the approximations of geometrical optics do not apply any more. For each system the corresponding boundary value problem has to be solved. The magneto-hydrodynamic oscillations of ionosphere are investigated, assuming that: a) an isothermal atmosphere fills the half-space $z > 0$ above a rigid plane; b) the magnetic field H is perpendicular to the gravitational field g (parallel to the boundary plane; c) the gas conductivity is high enough to enable the

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Oscillations of an isothermal...

assumption that the lines of force are frozen in the matter; d) the frequencies are lower than the ionic cyclotron frequency in a field H. The one-dimensional oscillations along the z-axis are described by a system of equations: Euler's equation, continuity, freezing-in of force lines and adiabaticity. The change in the adiabatic exponent from 5/3 in dense layers of the atmosphere to 2 in rarified layers hardly influences the results. The spectrum of frequencies is discrete. The extreme cases are analyzed: weak and strong magnetic fields. Separate harmonics can be resonantly excited by turbulent motions in the atmosphere. The theory gives a qualitative picture of magnetic pulsations, explains their mono-chromac character and gives an order of magnitude estimate of the corresponding frequencies.

ASSOCIATION: Moskovskiy gosundarstvennyy universitet, Institut yadernoy fiziki (The Moscow State University,

Card 2/3

S/203/62/002/001/006/019
I023/I223

Oscillations of an isothermal...

Institute of Nuclear Physics)

SUBMITTED: November 3, 1961

Card 3/3

[illegible] of intensity at heights of 100-350 km. [illegible] The informa-

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tributable to generation of par

SUBMITTED: 21Jan64

NO REF SOV: 003 OTHER: 004 ATD PRESS: 3220

L 35617-6' EWT(1)/EWG(v)/EEC-4/EEC(t)/EWA(h)/FCC Pm-4/Pe-5/Pr-4/Pae-2/Peb/Pi-:
S/0293/65/003/001/0128/0134

AUTHOR: Shavrin, P. I.

TITLE: Electron intensity of radiation belts at altitudes of 180-330 km in conjugate regions with negative geomagnetic anomalies

SOURCE: Kosmicheskiye issledovaniya, v. 3, no. 1, 1965, 128-134

TOPIC TAGS: electron intensity, radiation belt, aeronomy, geomagnetism, geomagnetic anomaly, Coulomb scattering, ... radiation outer radiation belt, conjugate point

ABSTRACT: Data from the second and third Soviet satellite-ships have been used in an investigation of the asymmetry of the electron intensity of the radiation belts at conjugate points in a case when one of them is underground. The recording instruments of these satellites made it possible to determine the planetary dis- ... data used were from a scin- tillation counter ... 24 hours. Compar...

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ACCESSION NR: AP5005441

point of a particle on the basis ... reflect electrons with small pitch
layers of the atmosphere can very ... reflect electrons with small pitch

ASSOCIATION: none

42136

S/203/62/002/012/017
I046/I246

3.9110 (2765, 4705)

AUTHOR: Tverskoy, B.A.

TITLE: Magnetohydrodynamic properties of two-dimensional turbulence in a rotating sphere

PERIODICAL: Geomagnetizm i aeronomiya, v.2, no. 2, 1962, 326-331

TEXT: Any magnetic field that sets in within a rotating gravitating sphere orients itself rapidly along the axis of rotation if a) the magnetic force lines are frozen into the substance of the sphere ($4\pi\sigma\nu/c^2 \gg 1$), and b) the relaxation of Batchelor's spontaneous field takes but a short time ($4\pi\sigma\nu/c^2 < 1$). Near the equatorial belt, the turbulent convection loses its two-dimensionality becoming isotropic. The magnetic flux through the plane of the equator is thus conserved, and the stationary field in the sphere is determined uniquely by this constant. Outside the sphere, even near its surface, the field is that of a magnetic dipole. Combining this fact with considerations of feedback effects for two-dimensional turbulence, the author arrives at correct figures for actual field intensities (5 to 10 gauss in the core, and 0.5 to 1 gauss on the surface of the earth). Since in principle two-dimensional

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X

Magnetohydrodynamic properties...

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I046/I246

turbulence is possible in the terrestrial core ($\eta \lesssim$ 1000 poise), this result shows that the geomagnetic field may be generated and sustained by this particular mechanism. The most important English reference reads: G.K. Batchelor, Proc. Roy. Soc., A201, 405, 1950.

ASSOCIATION: Moskovskii gosudarstvennyi universitet (Moscow State University) Institut yadernoi fiziki (Institute of Nuclear Physics)

SUBMITTED: December 21, 1961

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43162
S/203/62/002/003/014/021
I023/I250

39110

AUTHOR: Tverskoy, B.A.

TITLE: Self-excitation of a regular magnetic field when there is a two-dimensional convection in a rotating gravitating sphere

PERIODICAL: Geomagnetizm i Aeronomiya, v.2, no.3, 1962, 517-522

TEXT: All present theories of the geomagnetic field assume that it is sustained by convective motions of conducting masses in Earth's nucleus, but no precise mechanism was yet determined. The following mechanism of self-excitation is proposed:
1) Due to the two-dimensional turbulence, the magnetic field becomes orientated along the rotation axis and it proves proportional to the height of the corresponding field tube.
2) The equatorial belt of three-dimensional turbulence maintains the flux throughout the sphere. Changes in the flux can be caused only by fluctuations.
3) The field outside the sphere is close to a dipole field and pene-

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Self-excitation of a regular...

tratos into the sphere in the equatorial belt, where the velocity of flow is low.
4) Fluctuation processes can transfer field tubes into the region of two-dimensional turbulence with a change in polarity, causing thereby an increase of the magnetic flux through the sphere and, consequently, an increase in the dipole moment.
5) The self-excitation continues until the densities of magnetic and kinetic energy are equal.
The magnetic field thus formed in the nucleus has the dipole moment parallel to the rotation axis. After reaching a stationary value the field should remain constant in magnitude and direction. The various anomalies and also the failure of the magnetic and geographic axes to coincide are due to the relative motion of the nucleus and the shell os the sphere. The change of sign of the geomagnetic field is suggested to occur due to floating of the poles of Earth from one to the other hemisphere, or to the corresponding motion of continents. The period of the reoriontation of the Earth's dipole is 100000 years.

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I023/I250

Self-excitation of a regular...

Any faster changes cannot be explaine by the present theory. Assuming that Venus has a liquid nucleus, a magnetic field should be generated in it. Its dipole moment would be ~ 50% of that of the geomagnetic field, assuming an iron nucleus, and 10 - 25% according to the theory of phase transition. There are 12 references. Most important references:

B.A. Tverskoi. Geomagnetizm i Aeronomiya, 1961, 1, No.5, 629
" " " " 1961, I, No.5, 638
" " " " 1962, 2, No.2, 326

ASSOCIATION: Moskovskiy gosudarstvennyy universitet, Institut yadernoy fiziki (Moscow State University, Institute of Nuclear Physics)

SUBMITTED: December 21, 1961

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35572
S/056/62/042/003/031/049
B102/B138

26,2331

AUTHOR: Tverskoy, B. A.

TITLE: One-dimensional ?-ogressive waves, propagating in a plasma along the magnetic field

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42, no. 3, 1962, 833-838

TEXT: A one-dimensional stabilized wave is assumed to travel (with velocity U) through a dilute, cold, quasineutral plasma. The problem is to determine the shape of the impulse as dependent on dispersion and dissipation. The problem is solved in two steps: Determination of the pulse shape when neglecting dissipative processes, and determination of dissipative effects on this shape. Without dissipation, the pulse shape will be constant (if far enough from the source) and depend only on the velocity, i. e. the energy $\mathcal{E}$ of the pulse. On the assumptions that the plasma should be dilute enough to neglect Coulomb interaction, cold enough to neglect its thermal motion and that the particle velocities are small in relation to c, the calculations are carried out in nonrelativistic single-particle approximation, neglecting collisions. The plasma is assumed to

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consist of electrons (velocity $\vec{v}$) and singly charged ions (velocity $\vec{V}$), and the $H_0$-field ($\vec{H}_0 \parallel x$) is assumed to be uniform. The basic equations of the problem can be reduced to

$$\Theta d\Theta/ds = \operatorname{Im} PQ^*,$$
$$dP/ds = (\Theta^{-1} - M^2) iP - \mu M^2 iQ, \qquad (19)$$
$$\mu dQ/ds = -(\Theta^{-1} - \mu M^2) iQ + M^2 iP.$$

with the boundary conditions $\Theta=1$, $P=Q=0$ for $s \to +\infty$, $s = eH_0\xi/mcU$, $\vec{W} = \vec{V}/U$, $\vec{w}=\vec{v}/U$, $\Theta = 1-W_x$; the magnetic Mach number $M = \sqrt{4\pi N_0 m}\,U/H_0$, $\xi = x-Ut$. $\mu$ is the electron-to-ion **mass ratio.** A separation of real and imaginary part yields



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One-dimensional progressive waves, ...

$$\begin{aligned} &\Theta d\Theta/ds = -q_1 p, \\ &dp/ds = \mu M^2 q_1, \\ &K = \Theta^{-1} - M^2 - \mu M^2 q/p, \\ &\mu dq/ds = (\Theta^{-1} - \mu M^2)\, q_1 \\ &\mu dq_1/ds + \mu K q = -(\Theta^{-1} - \mu M^2)\, q + M^2 p. \end{aligned} \quad (A)$$

with

$$P = p \exp\left\{i \int K(s)\, ds\right\}, \quad Q = (q + iq_1) \exp\left\{i \int K(s)\, ds\right\}, \quad (20),$$

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and with

$$\Theta = \sqrt{1-\varphi^2},$$
$$q = (\arcsin\varphi - \alpha^2\varphi)/\mu\alpha, \qquad \text{(B)}$$
$$K = \frac{1}{\sqrt{1-\varphi^2}} - \frac{1}{\mu}\frac{\arcsin\varphi}{\varphi}.$$

$$q_1(\varphi) = \pm\frac{1}{\mu\alpha}\left[2\int_0^{\varphi}\frac{\arcsin^2\varphi}{\varphi}\,d\varphi - (1+\mu)\arcsin^2\varphi + \right.$$
$$\left. + 2\alpha^2(1+\mu)\left(1-\sqrt{1-\varphi^2}\right)\right]^{1/2}. \qquad (29)$$

is obtained as an exact solution of (19). $\alpha = \sqrt{\mu}\,M$, $p = \alpha\varphi$. This result is simplified for waves of medium and small intensity by expanding $q_1(\varphi)$ into a series and taking the first terms only. The results can be used for $M \leqslant 10$ with an accuracy of $\geqslant 3\%$.

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$$q_1(\varphi) = \pm \varphi \mu^{-1} \Lambda(M) \sqrt{1 - \varphi^2/6\alpha^2 \Lambda^2(M)}, \qquad (30)$$

$$\Lambda(M) = \sqrt{(M^2 - 1)/M^2 + \mu}. \qquad (31)$$

$$\delta = \frac{\sqrt{\mu} mcU_0}{eH_0} \frac{M}{[M^2(1+\mu) - 1]^{1/2}} \qquad (32);$$

$q = \frac{\sqrt{6}\Lambda}{\mu} / \mathrm{ch} \frac{M\Lambda}{\sqrt{\mu}} s$; $q_1 = \sqrt{\frac{6}{\mu}} M\Lambda^2 \, \mathrm{sh} \frac{M\Lambda}{\sqrt{\mu}} s / \mathrm{ch}^2 \frac{M\Lambda}{\sqrt{\mu}} s$; $K = -\frac{1}{\mu}$. Quasilinearity can be assumed if $6\mu\beta^2 M^6 \ll 1$, and non-relativity if $\beta M \Lambda \ll \mu$. The pulse width is given by

$$\varphi = \sqrt{6} \alpha \Lambda / \mathrm{ch} \frac{M\Lambda s}{\sqrt{\mu}}. \qquad (40).$$

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B102/B138

One-dimensional progressive waves, ...

The equations obtained for the field lines and particle trajectories show that they form spirals with a pitch of $M\mu\xi_o$, which increases with the wave intensity. This chirality is caused by the nonlinear effects. The particle density maximum coincides with the pulse maximum. The relation between Mach number and wave energy is obtained as $\mathcal{E} = 6\Lambda M^2\mathcal{E}_o/\sqrt{\mu}$, $\mathcal{E}_o = H_o^2 mcU_o/8\pi eH_o$ is the magnetic energy of the non-perturbed field per $cm^2$ and unit length $\xi_o$;

$$M^2 = 1 + \sqrt{1 + \frac{\mu}{36}\left(\frac{\mathcal{E}}{\mathcal{E}_0}\right)^2}/2(1+\mu). \qquad (44).$$

Even small oscillations of the magnetic field cause a considerable acceleration of the electron component at the pulse maximum; $v_o = \sqrt{6\Lambda M U_o/\mu}$ is the maximum electron velocity. For the ions, $V_o = \sqrt{6M^3/\Lambda\mu}U_o$ i. e. most of the wave energy appears as kinetic electron energy. There are 4 Soviet references.

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One-dimensional progressive waves, ...

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute of Nuclear Physics of Moscow State University)

SUBMITTED: September 25, 1961

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35725
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B104/B102

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24.2500

AUTHOR: Tverskoy, B. A.

TITLE: Stability of the flow of a well conducting liquid across a magnetic field

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 2, 1962, 301-304

TEXT: Proceeding from the linearized magnetohydrodynamic equations (4)-(5),

$$\frac{\partial h}{\partial t} + v_z \frac{d\vec{\mathcal{H}}}{dz} = (\vec{\mathcal{H}}\nabla)\,v,$$

$$\frac{\partial}{\partial t}\operatorname{rot} v = \frac{1}{4\pi\rho}\operatorname{rot}\left\{(\vec{\mathcal{H}}\nabla)\,h + h_z\frac{d\vec{\mathcal{H}}}{dz}\right\}$$

where $\mathcal{H}_x = H_o\lambda z$, $\mathcal{H}_y = 0$, $\mathcal{H}_z = H_o$, and $\lambda = \frac{4\pi}{H^2}\frac{dP}{dx}$, disturbances of the flow rate $\vec{v}$ and the field $\vec{h}$ are investigated, which lie in the xz-plane and are independent of y. By eliminating $v_x$ one obtains

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Stability of the flow of ...

$$\frac{d}{dz}\left\{\omega^2+\frac{H_0^2}{4\pi\rho}\left(2ik\lambda z+\frac{d}{dz}\right)^2\right\}\frac{dv}{dz}=k^2\left\{\omega^2+\frac{H_0^2}{4\pi\rho}\left(2ik\lambda z+\frac{d}{dz}\right)^2\right\}v. \quad (10),$$

$v_z \equiv v$, which acquires the form

$$\frac{d}{ds}\left\{\Lambda^2+\left(2i\varkappa s+\frac{d}{ds}\right)^2\right\}\frac{dv}{ds}=(kl)^2\left\{\Lambda^2+\left(2i\varkappa s+\frac{d}{ds}\right)^2\right\}v. \quad (10')$$

by introducing the dimensionless coordinate s = z/l and the parameters

$$\varkappa=l^2k\lambda=\frac{4\pi}{H_0^2}\frac{dP}{dx}kl^2, \quad \Lambda=\frac{l\omega\sqrt{4\pi\rho}}{H_0}.$$

The analysis of this equation is restricted to cases which are of interest for cosmic electrodynamics. The equation

$$\frac{d}{ds}\left\{\Lambda^2+e^{-i\varkappa s^2}\frac{d^2}{ds^2}e^{i\varkappa s^2}\right\}\frac{dv}{dx}=0. \quad (12)$$

is obtained by neglecting the right-hand side of (10') and allowing for the identity of operators

$$\left(2i\varkappa s+\frac{d}{ds}\right)f=e^{-i\varkappa s^2}\frac{d}{ds}e^{i\varkappa s^2}f, \quad (11).$$

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In addition to the solution v = const, this equation also has two even and two odd solutions. All the even solutions are stable. The odd solutions can be represented by

$$\frac{\operatorname{tg}\Lambda}{\Lambda}=\frac{1}{\varkappa\Lambda}\frac{\int\limits_0^1(\sin\varkappa\cos\varkappa x^2-\cos\varkappa\sin\varkappa x^2)\frac{\sin\Lambda\cos\Lambda x-x\cos\Lambda\sin\Lambda x}{1-x^2}dx}{\left(\int\limits_0^1\cos\varkappa x^2\cos\Lambda x\,dx\right)^2+\left(\int\limits_0^1\sin\varkappa x^2\cos\Lambda x\,dx\right)^2}. \qquad (14).$$

As the right-hand side of this function is limited, its graphical representation cuts all the branches of the tan $\Lambda/\Lambda$, except those between $-\pi/2$ and $\pi/2$. Accordingly, there is an infinite number of stable solutions. The unstable solutions, which are related to the branches mentioned above, are analyzed for the case of long waves ($\varkappa \gg 1$). There are 6 references: 2 Soviet and 4 non-Soviet. The three references to English-language publications read as follows: R. C. Lock, Proc. Roy. Soc., 233A, 189 (1954); G. K. Batchelor, Proc. Roy. Soc., Ser. A., 201, 405 (1950); H. Alfvén, Phys. Rev., 75, 1732 (1949).

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Stability of the flow of ... S/020/62/143/002/008/022
B104/B102

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

PRESENTED: July 4, 1961, by M. A. Leontovich, Academician

SUBMITTED: June 30, 1961

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38105

S/020/62/144/002/017/028
B104/B102

AUTHOR: Tverskoy, B. A.

TITLE: Effect of a magnetic field on the increase of the amplitude of acoustic waves in a medium of decreasing density

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 144, no. 2, 1962, 338-340

TEXT: The following magneto-hydrodynamic equation for oscillation of the atmosphere is set up:

$$(\varkappa^2 + e^{-\xi}) \frac{d^2 v}{d\xi^2} - e^{-\xi} \frac{dv}{d\xi} + e^{-\xi} \lambda^2 v = 0,$$

$$\varkappa^2 = \frac{H_0^2}{4\pi\gamma p_0}, \quad \xi = \frac{z}{z_0}, \quad \lambda^2 = \frac{\omega^2 z_0}{\gamma g}.$$

If $\varkappa^2 = 0$, the solution of this equation corresponds to cumulative acceleration. For $\varkappa \neq 0$, and using the substitution $x = 1 + \exp(-\xi)/\varkappa^2$, the equation of oscillation is transformed into a hypergeometric equation. The solution for $x > 1$ reads: $v_1 = (1/x)^\alpha F(\alpha, \alpha, 2\alpha, 1/x)$;

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$V_2 = v_1^*$ (where F is a hypergeometric function). At $x \to 1$, the two solutions diverge logarithmically. The following linear combinations remain finite at $x \to 1$:

$$v_3 = \mathrm{Im}\left\{0\left(\frac{1}{x}\right)^a F\left(a, a, 2a, \frac{1}{x}\right)\right\}$$

and

$$v_4 = \mathrm{Re}\left\{0^*\left(\frac{1}{x}\right)^a F\left(a, a, 2a, \frac{1}{x}\right)\right\}.$$

At larger intervals, the solutions pass over into electromagnetic waves. If $k \ll 1$ and $x \ll 1$, the relation for the wave velocity reads:

$$v \approx v_0 e^{\xi/2} \frac{\sin(s\xi + 2s\ln x - \varphi)}{\sin(2s\ln x - \varphi)},$$



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Effect of a magnetic field on the ... S/020/62/144/002/017/028
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This is a solution of the acoustic type with growing velocity. Academician M. A. Leontovich is thanked for his advice.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

PRESENTED: December 23, 1961, by M. A. Leontovich, Academician

SUBMITTED: December 14, 1961

Card 3/3

S/203/63/003/001/005/022
A061/A126

24.2120

AUTHORS: Sigov, Yu. S., Tverskoy, B. A.

TITLE: On the structure of the boundary layer between a magnetic field and a plasma stream

PERIODICAL: Geomagnetizm i aeronomiya, v. 3, no. 1, 1963, 43 - 49

TEXT: The boundary layer between a plasma stream and a magnetic field was investigated by taking account of the thermal spread of the ion velocities. By starting from the linear equations of electron motion in a magnetic field it is shown that the electric field can be neglected when examining an equilibrium boundary between corpuscular stream and magnetic field. The plane boundary layer between a magnetic field being uniform in $+\infty$ and a plasma stream coming from $-\infty$ is investigated. The problem, which is mathematically equivalent to the problem of equilibrium of a plasma stream being normal to a magnetic field and consisting of positive and negative ions of equal mass, is solved by the method of velocity groups. Taking the thermal spread of ion velocities into account

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On the structure of the boundary layer ..... S/203/63/003/001/005/022
A061/A126

leads to a thin structure of the boundary layer." The existence of a boundary layer of elevated particle density can be the cause of autonomous instabilities. The oscillations occurring as a result of these instabilities are apt to produce interesting effects, e.g. the trapping of particles by the geomagnetic field. There are 5 figures.

ASSOCIATION: Matematicheskiy institut im. V. A. Steklova AN SSSR (Institute of Mathematics imeni V. A. Steklov AS USSR) Moskovskiy gosudarstvennyy universitet, Institut yadernoy fiziki (Moscow State University, Institute of Nuclear Physics)

SUBMITTED: October 16, 1962

Card 2/2

SIGOV, Yu.S.; TVERSKOY, B.A.

Structure of the boundary layer between the magnetic field and the plasma stream. Geomag. i aer. 3 no.1:43-49 Ja-F '63. (MIRA 16:4)

1. Matematicheskiy institut imeni V.A.Steklova AN SSSR i Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta.
(Magnetic storms)

TVERSKOY, B. A.;

"On the nature of the Earth's radiation belts". (USSR)"

Report submitted for the COSPAR Fifth International Space Science Symposium, Florence, Italy, 8-20 May 1964.

TVERSKOY, B.A.

Structure of shock waves in a plasma. Zhur. eksp. i teor. fiz.
46 no.5:1653-1663 My '64. (MIRA 17:6)

1. Institut yadernoy fiziki Moskovskogo gosudarstvennogo
universiteta.

ACCESSION NR: AP4040706 S/0203/64/004/003/0436/0457

AUTHOR: Tverskoy, B. A.

TITLE: Dynamics of the radiation belts of the earth. 2

SOURCE: Geomagnetizm i aeronomiya, v. 4, no. 3, 1964, 436-457

TOPIC TAGS: terrestrial radiation belt, geomagnetic field, magnetosphere, ring current, corpuscular stream, magnetic storm, ionosphere, potential magnetic force line, neutron decay

ABSTRACT: The terrestrial radiation belts are unstable, and their variations are associated with disturbances of the geomagnetic field owing to displacements of the boundary of the magnetosphere or to the appearance of ring currents. Strong increases in the pressure of corpuscular streams on the magnetosphere generate magnetic storms with sudden commencement. These magnetic disturbances consist of three components: the current field at the boundary of the magnetosphere, the current field appearing in the lower part of the ionosphere and at the earth's surface, and the drift current field in the magnetosphere. The first two components are of potential nature and

ACCESSION NR: AP4040706

the third component is located in shells of the magnetosphere. The lines of force of the magnetic field of the magnetosphere move together with the charged particles. The particles on the daylight side approach the earth and those on the night side leave the earth. In 1959-1961 the outer belt was in a stable state, but in 1962 its structure was changed due to a sharp decrease in the frequency of magnetic storms and capture of neutron decomposition products. A theoretical attempt was made to explain the appearance of radiation belts by motion of charged particles in an electromagnetic field and by the activity of magnetic storms. Orig. art. has: 5 figures, 77 formulas, and 1 table.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet, Institut yadernoy fiziki (Moscow State University, Institute of Nuclear Physics)

SUBMITTED: 28Nov63 ATD PRESS: 3042 ENCL: 00

SUB CODE: AA NO REF SOV: 006 OTHER: 014

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ACCESSION NR: AP4031625 S/0203/64/004/002/0224/0232

AUTHOR: Tverskoy, B. A.

TITLE: Dynamics of radiation belts of the earth. 1. Sources of high speed particles

SOURCE: Geomagnetizm i aeronomiya, v. 4, no. 2, 1964, 224-232

TOPIC TAGS: radiation belt, high speed particle, magnetic storm, drift orbit, magnetosphere, ionospheric acceleration

ABSTRACT: The author has undertaken this study because of the inadequacy of the process of neutron decay (or any other process previously proposed) to explain the outer radiation belt. Even as a cause of the inner belt, neutron decay can be considered only secondary: responsible for injection of particles but not of the intensity distribution in space. During magnetic storms, high-speed particles from interplanetary space (electrons, protons, and helium nuclei) are captured in closed drift orbits at some distance from the earth. In drift shells at a distance of 6-7 earth radii from the earth's center, the intensity of these particles is

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ACCESSION NR: AP4031625

maintained at an average value that differs from zero. Neutron decay is a second source of high-speed particles. Diffusion of particles across the drift shells leads ultimately to removal of these particles from the magnetosphere. Ionospheric acceleration, however, even when increase in reflection points by diffusion is considered, cannot explain the outer radiation belt near the equatorial plane. Neither experimental data nor theoretical computations indicate at the present time any sources of particles with energies greatly exceeding 100 kev, apart from those pointed out here. Orig. art. has: 1 figure and 9 formulas.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet (Moscow State University); Institut yadernoy fiziki (Institute of Nuclear Physics)

SUBMITTED: 28Nov63 DATE ACQ: 30Apr64 ENCL: 00

SUB CODE: ES NO REF SOV: 007 OTHER: 010

Card 2/2

L 20462-66 EWT(1)/FCC/EWA(h) GW
ACC NR: AP6012055 SOURCE CODE: UR/0203/65/005/005/0793/0808

AUTHOR: Tverskoy, B. A. 47

ORG: none 13

TITLE: Transfer and acceleration of charged particles in the Earth's magnetosphere

SOURCE: Geomagnetizm i aeronomiya, v. 5, no. 5, 1965, 793-808

TOPIC TAGS: geomagnetic disturbance, geomagnetic field, electric field, asymptotic solution, proton, radiation belt, electron

ABSTRACT: This is a review, based on 33 cited sources. With accumulation of experimental data and development of the theory of the radiation belts the role of transfer of trapped particles across the drift shells of the geomagnetic field became increasingly clear. The transfer is caused by the drift of particles in nonstationary electrical fields arising during geomagnetic disturbances. The full nature of this phenomenon is described as developed over a period of years. A detailed investigation of stationary and nonstationary transfer processes with Coulomb losses taken into account resulted in an asymptotic solution for protons of the inner belt and the position of the maximum of the outer proton belt was estimated as a function of particle energy. Results published in 1964 led to an appreciable reevaluation of transfer processes. These made it possible to compute the principal constant $D_0$ of transfer theory directly on the basis of magnetic data. The latest data indicate that the characte-

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ristic times of transfer in actuality are two orders of magnitude less than assumed earlier. This conclusion agrees well with the results of determination of the lifetime of electrons on the basis of an analysis of the dynamics of the aritficial radiation belts. Orig. art. has: 5 figures and 36 formulas. [JPRS]

SUB CODE: 08, 20, 04 / SUBM DATE: none / ORIG REF: 013 / OTH REF: 021

Card 2/2 BK

L 20541-66 EWT(1)/EWP(m)/EWA(d)/ETC(m)-6/EWA(1) WW

ACC NR: AP6006653 SOURCE CODE: UR/0203/66/006/001/0011/0018

AUTHOR: Tverskoy, B. A.

ORG: Moscow State University, Institute of Nuclear Physics (Moskovskiy gosudarstvennyy universitet, Institut yadernoy fiziki)

TITLE: On the theory of hydrodynamic self-excited regular magnetic fields

SOURCE: Geomagnetizm i aeronomiya, v. 6, no. 1, 1966, 11-18

TOPIC TAGS: magnetic field, hydrodynamics, hydromagnetics, vortex, Reynolds number

ABSTRACT: A theoretical study is made of the hydromagnetic phenomena in toroidal vortices. First, the field amplification in a toroidal vortex is analyzed without dissipative effects. This is done for a large magnetic Reynolds number, using the magnetic induction equation which, for the simplest case, leads to the expression

$$H_{\chi_{m0}}(t)=\frac{arH_{0r}(r)}{a+r\cos\chi}\frac{d\Omega(r)}{dr}te^{im\varphi}.$$

Next, to illustrate the field amplification phenomena, the example of a liquid sphere is considered in a pulsating vortex leading to the expression

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ACC NR: AP6006653

$$H_\chi(r, \chi, \varphi, t) = -\frac{r^2\Omega_0 tM}{2\pi r_0 l^3(a + r\cos\chi)}[(k^2l^2 - 1)\sin kl + kl\cos kl]\cos\varphi.$$

This shows that toroidal vortices can cause a continuous regeneration of poloidal fields. This self-excitation is also observed in plane convective zones filled with conducting fluids in vacuum. Orig. art. has: 31 equations.

SUB CODE: 20/ SUBM DATE: 04Jun65/ ORIG REF: 003/ OTH REF: 004

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